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The Automobile vs. Insects.

By A. O. LARSON, U. S. Bureau of Entomology

(Continued from page 51)

Although the automobile is so important a factor in the transportation of injurious insects, it must also be recognized as an effective agency in reducing their numbers.

As early as 1896, when motor cars were rare, Dr. Howard (4) predicted that the replacing of the horse by the automobile would very greatly reduce the number of house flies in many localities. This prediction has been fulfilled. Viosca (5) reviewing the house fly situation in New Orleans, states that within the last few years, there has been a marked decline of the house fly pests in that city. In discussing the causes of this decline he says, "No doubt a very significant factor is that which caused the decrease of the sparrow, viz.: the increase of the automobile. Not only does the consequent decrease in the number of horses mean less manure, but that which is deposited on the streets is soon rolled over and scattered by automobiles and is thus quickly dried or otherwise made inaccessible to fly larvae. The paving of streets facilitates this destruction by traffic of the chief pabulum for the fly larvae."

Discussing *Culex quinquefasciatus,* the chief night-biting mosquito of New Orleans, Viosca (6) says, "Organic pollution such as is characteristic of city wastes determines its prevalence, and it is therefore the chief gutter breeder of the city. Natural enemies do not usually play any appreciable part in the control of this species, because of the artificial character of its choice habitat. * * * The installation of surface drainage and paving was not followed at once by a corresponding reduction of the species in the paved sections, and there was evidence of widespread breeding in the surface canals. This would have been a difficult problem to deal with were it not for the advent of the automobile, the oil drippings from which, includ-

ing garage wastes, enter the drainage system and there serve as efficient larvacides. * * * Our chief habitats today are found in open gutters on unpaved streets, and open drainage canals in suburban sections where the oil wastes do not control the situation."

Dr. Howard has informed me that at the Second International Entomological Congress at Oxford in 1912, the Rev. F. Morice stated that motoring was destroying many famous old entomological localities in England by filling the hedgerows full of dust and debris. This condition might be expected to exist along unpaved country roads, where in dry weather every passing automobile would be followed by a great cloud of dust.

During the summer one can scarcely motor through an agricultural section without noting the great numbers of insects that are killed by automobiles.

In August, 1915, Mr. Giffard (7) resorted to the automobile as a means of collecting insects in California. In this work he used the ordinary collecting muslin net as a trap, holding it at the side of the car when the speed was not more than 12 to 15 miles per hour. Speaking of his interesting collection obtained on two trips in three hours of traveling, he says:

"Of the *Coleoptera* there are eight families, consisting of 16 genera and 18 species, totaling 43 specimens. Of the *Hymenoptera* there are five families, consisting of 14 genera, and 16 species, totaling 28 specimens. Of the *Hemiptera* there are six families, consisting of 9 genera and 9 species, totaling 18 specimens. The numerous Dipterons were undetermined. The grand total comprises three orders, 19 families, 39 genera, and 43 species. In all 89 specimens, excluding Dipterons."

This record is interesting because of the absence of the butterflies and dragon-flies which must have been very numerous in Santa Clara County at that time. The complete absence of these insects is readily accounted for by the fact that they are able to dart away from a slowly moving vehicle. However, two or more insects per mile were caught. How many escaped after entering the net is problematical. There was no special attracting force in the net either to draw the insects into it

or to hold them after they were within, but the front of the automobile, having an area several times as great as that of the net, also acted as an insect trap, the motor-impelled air current of the cooling system serving as an added force to draw the insects into it. There they were killed or crippled by the impact of their bodies against, or by contact with heat and oil under the hood of the machine. As the speed of the automobile is increased, the chances for insects to escape from its path are lessened, and the force of the ingoing current of air being also increased, even the very swift fliers are caught. The suction of the air current makes butterflies appear to dart against the front of a speeding automobile, where they frequently remain attached until it stops. When the fan-driven air current is no longer sucked through the radiator, the butterflies usually fall to the ground, but they are often so deeply embedded in the air spaces of the radiator that they do not fall. Where two insects per mile are caught in so small a space as an insect net moving at 12 to 15 miles per hour, how many must be killed by the front of a rapidly speeding automobile?

On September 10, 1925, while driving through the San Joaquin Valley, I decided to record the number of automobiles that I met and the number of butterflies contained thereon. Twenty-five miles of wide smooth paved road between Merced and Turlock gave a good opportunity for making such a record. I left Merced at 4.25 P. M. and arrived at Turlock at 5.20 P. M., making the 25 miles in 55 minutes. Over this distance all automobiles and trucks were recorded. In some instances it was impossible to get an exact count of the butterflies on the front of the radiator, but a fairly accurate count was obtained. The faster the machines were moving the more butterflies they caught. Some cars and practically all trucks carried no butterflies. Most of the trucks and some of the other machines were moving too slowly to catch butterflies as they passed. In all, I recorded 212 automobiles carrying 490 butterflies. This was about two and three-tenths butterflies for each machine or about twenty butterflies to the mile and nine each minute of travel.

The next day while going from Waterford to Modesto, over a distance of twelve miles, my machine caught six butterflies just before noon. At noon I noticed a car standing at the curb with 40 butterflies on the front of its radiator. It reminded me of the appearance of most rapidly moving automobiles along any of the roads of southern California during the time of the remarkable flight of the painted lady, *Vanessa cardui*, in 1924. During that time newspapers reported that motorists were sometimes compelled to stop and remove the butterflies from their machines in order to give their engines proper ventilation. Undoubtedly this was true in some instances with air-cooled machines.

On September 17, while driving to Sacramento, I recorded the number of butterflies on all automobiles other than trucks which I met over the first five miles after leaving Modesto. This distance, I traveled in 15 minutes, between 2.15 and 2.30 P. M. I noted 45 automobiles carrying 174 butterflies. This was approximately four to the machine, 35 to the mile, and 12 every minute. Several species were included but the alfalfa butterfly, *Eurymus eurytheme*, the cabbage butterfly, *Pontia rapae*, and the painted lady, *Vanessa cardui*, were present in greatest numbers. The first named was probably more numerous than all others combined.

These butterflies were not all caught on the measured distances in which they were recorded, neither do they give an accurate check on the numbers that were being killed by the machines because many, possibly several times as many, of the butterflies were crippled or killed and knocked to the pavement, where they could be seen as they were moved about by the breezes. The count represents only those which were firmly attached to the machines moving in one direction, that is, those that were held in place as a result of the currents of air which rush inward through the radiators.

This insect mortality is not confined to butterflies alone. Moths, dragon-flies, beetles, bumblebees and other bees, wasps, hornets, species of flies too numerous to mention, grasshoppers, aphids and other flying insects are killed in tremendous numbers, not only by the radiator but also by the windshield, wind

wings and other parts of the automobile. On smooth paved roads the windshield often becomes smeared with the smashed bodies of bees and soft-bodied flying insects.

Caterpillars, beetles and other crawling insects are killed in smaller numbers, but in a state having one and one-fourth millions of automobiles and thousands of miles of paved roads, as California has, the number of crawling insects which are killed must daily mount to large figures. The number of butterflies and moths which are killed each day probably runs into the millions over part of the summer and autumn and into the hundreds of thousands daily over a much longer period of time. Large numbers are thus killed even during the warm days of winter. On December 26th in Riverside County, I saw as many as three butterflies on the fronts of some automobiles.

In this connection the observations of H. R. Dill, of the University of Iowa, published in Science (8) are of interest. Mr. Dill, discussing the number of animals killed by automobiles, called attention to the dead insects that were taken from the back of his automobile radiator and from the catch pan below. Nearly one pint of insects was removed, in which he was able to recognize 20 grasshoppers, 17 cabbage butterflies, 16 bot flies, 14 honeybees, and parts of many house flies, moths, and beetles. These insects were the residual accumulation of about 2,000 miles of travel; many, of course, had disintegrated or fallen along the way. Mr. Dill thought one pint a fair estimate of the quantity of insects killed by a car of average size in traveling 2,000 miles, stating that larger cars traveling at a higher speed would kill many more. Allowing one pint as the average catch of one car, he makes the interesting deduction that the eighteen million cars now in use in this country would kill a block of insects 30 feet square and as high as the Woolworth Building in New York City.

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The Genus Stenoxenus (Chironomidae, Diptera).

By O. A. JOHANNSEN, Cornell University, Ithaca, New York.

Thus far but two species of this peculiar Ceratopogonine genus have been described, one from the United States, the other from Peru. A second Peruvian species is described herewith. The following key will serve to distinguish them.

1. Yellowish species; the anterior branch of the radius ends in the costa beyond 7/8 the wing length. Peru. . *fulvus* n. sp.
— Blackish species; anterior branch of the radius ends almost opposite the middle of the anterior branch of M. 2
2. Basal antennal segment, black, very large, broader than long. N. J. . . . . *johnsoni* Coq. (Ent. News 10: 60, 1899).
— Basal antennal segment yellow, of moderate size, as broad as long. Peru.
dimorphus Kieffer (Ann. Mus. Nat. Hung. 7: 46, 1909).

Stenoxenus fulvus n. sp. ♀. Head rusty yellow, shining; front nearly one-third as wide as the head, not excavated; face broader than the front, prominent, produced downward, tapering, dark amber-colored, with few erect hairs; the proboscis small; palpi yellow, short, apparently three-segmented, first about as long as broad, last one somewhat smaller and shorter than the second. Antennae somewhat shrivelled in drying,

of the usual Ceratopogonine type, first segment of moderate size, yellow, subglobular, the second one cylindrical, yellow, the intermediate segments somewhat darker, the apical ones paler yellow, hairs sparse. Eyes bare, moderately emarginate at the base of the antennae.

Thorax including scutellum, yellow, shining, not produced over the head, not bristly but sparsely pilose with short yellow, more or less depressed hairs.

Abdomen shrivelled in drying, elongate, brown, shining, venter more yellowish, sparsely pale haired.

Legs slender, yellow, sparsely short-haired. The segments of the fore legs have the proportions 45 : 45 : 25 : 11 : 3 : 3 : 5; the middle legs are slightly longer but with about the same proportions; the segments of the hind legs are as 73 : 80 : 48 : 22 : 3 : 3 : 5. The fourth tarsal segment of all the legs is pilose below, spoon-shaped, with the articulation of the fifth within the cavity; claws with a small tooth; empodium vestigial; pulvilli absent; hind tibia broadened apically, with a dark, curved spur; first and second tarsal segments each ciliated below with a row of closely set, small, slightly curved setae, each set on a brown base that bears in addition two small divergent hairs (ctenidiobothriae, Enderlein, 1903).

Wing bare, 4 mm. long, three times as long as broad. In the pinned specimen the anterior longitudinal veins appear to be coalescent as far as the forking of the media, as shown in Coquillett's and Kieffer's figures (l. c.), but in a balsam mount the wing flattens out and then the subcosta, radius and media, though close together and parallel, are distinct from each other; the subcosta is evanescent at the tip ending free about the middle of the wing; anterior branch of R rises at the middle of the wing-length just proximad of the origin of the r-m crossvein, runs very close to the radial sector and then curves forward to join the costa at about 0.11 the wing length from the apex measured parallel to the longitudinal axis; from the point where the anterior branch curves forward the radial sector gradually approaches the costa, joining it tangentially very distinctly behind the wing tip; the r-m crossvein is short and oblique in position, located but very little beyond the mid length of the wing. The media is very delicate and colorless, the anterior branch running about as indicated in Kieffer's figure, but less sinuate at the tip; the two sections of the posterior branch are perpendicular to each other, the latter is nearly straight, curving posteriorly only slightly at the apex; the cubitus forks at about one-sixth of the wing-length from the base, the anterior branch joins the wing margin slightly

distad of the crossvein, the tips of the two branches are separated by a distance equal to seven-eighths of the maximum width of the wing; the anal vein is somewhat sinuate, its tip approaching and almost touching the posterior branch of the cubitus a little beyond the fork; anal angle strongly developed. Halteres yellow. Length 2 mm.

The *holotype* in the Cornell University collection was taken by Dr. J. C. Bradley at La Chorerra, Putumayo district, Peru, on August 17, 1920.

Three New Species of Psilopus from North America, and Notes on caudatus Wied. (Dipt.: Dolichopodidae).

By M. C. Van Duzee, Buffalo, New York.

Psilopus parvicauda new species.

♂: Length 3 mm., of female 4 mm. Face blue with white pollen, bare. Front green. Palpi small, black, with white hair; proboscis yellow. Antennæ black, small, second joint with two bristles below, which are about as long as the antenna; arista about as long as the head height.

Thorax and abdomen green; thorax, scutellum and base of abdomen with violet reflections, bristles and hairs black, hairs on the venter of abdomen mostly black. Hypopygium small; its lamellæ very small with short black hair.

Fore coxæ and all femora and tibiæ yellow, tips of posterior tibiæ black; middle and hind coxæ wholly black, anterior pair with a few white hairs on front surface and two black bristles near the tip; all femora with a few, long, white hairs below; fore tibiæ with three extremely small bristles on upper posterior edge; middle and hind ones with one bristle near basal third of upper surface. Fore and middle tarsi infuscated from tip of first joint, hind tarsi wholly black with a bristle below at base of first joint, apical joint very slightly widened; middle basitarsus with two or three spines below on apical half. Joints of fore tarsi as 41-12-9-6-5; of middle ones as 48-16-13-7-5; joints of posterior pair as 37-16-12-6-6. Calypters yellow with a black border and cilia; halteres yellow.

Wings grayish; last section of fourth vein with its fork at right angles, the part from the crossvein to the fork 27, from fork to wing margin 25-fiftieths of a millimeter long; crossvein 18, last section of fifth vein 16-fiftieths long.

♀: About as in the male; it has the last joint of posterior

tarsi slightly widened, the bristles of the legs as in the male, the violet reflections extend onto the front and to the tip of the abdomen.

Described from three specimens, which I took at Wainfleet, Ontario, July 20 & 26, 1924. *Type* and *allotype* in the author's collection.

Psilopus graenicheri new species.

In addition to the characters given under *caudatus* below, the following points may help identify the species. Length 4-5 mm. Third antennal joint small, nearly round, not longer than wide, second joint with two bristles which are as long as the antenna, the others short; arista dorsal, as long as the eye height. Wing venation as in *caudatus* Wiedemann and *cockerelli* described below. Longest hairs at tip of hypopygium 83-fiftieths of a millimeter long. The male has on the middle basitarsi, besides the hooked spines below, a row of hairs or slender bristles on upper anterior edge, which are as long as the diameter of the joint; fore tibiæ with two bristles on upper posterior edge and one on lower posterior edge, also two very small ones on posterior surface near the base; joints of fore tarsi as 48-14-12-7-6; of middle ones as 51-15-10-5-5; those of posterior pair as 42-20-12-7-7. Both male and female have on the posterior tibiæ a rather long bristle at basal third of upper anterior surface and one a little smaller at apical third.

The female has three bristles above on fore tibiæ, no bristles long enough to notice below; middle tibiæ with one large bristle on upper anterior edge near basal third, one near the middle and a very small one near the base, below they have one before and one after the middle; joints of fore tarsi as 53-10-12-8-7; of middle ones as 47-26-15-8-7; joints of posterior pair as 52-21-15-9-9.

Described from ten males and sixteen females, all taken at Miami, Florida, in January, February and May, 1924, by S. Graenicher, after whom I take pleasure in naming the species. *Type* and *allotype* in the Canadian National Collection.

Psilopus cockerelli new species.

♂: Length 4 mm. Face green with blue reflections and long white hair; front shining green. Antennæ black, second joint with two bristles below, which are as long as the antenna, third

joint small, not longer than wide; arista dorsal, as long as the height of the head.

Thorax green with blue reflections, its bristles moderately long; pleuræ dulled with white pollen. Abdomen green, second segment with blue reflections; fourth segment with the base purple then with a little brilliant coppery, the apical part more golden bronze; fifth of nearly the same color. Hypopygium as in *scobinator* Loew; the height of the apical end is 24-fiftieths of a millimeter, the longest hairs at tip are 16-fiftieths, its appendages very small.

Coxæ black, anterior pair more blue with long white hair; femora blue-green, their tips and the trochanters yellow, all femora with a row of white hairs below, which are not as long as their width. Tibiæ yellow, posterior pair black on apical fifth. Fore tarsi black from tip of first joint, hind tarsi wholly black; middle tibiæ with a long erect spur at tip, a row of four bristles on lower anterior edge of basal half and one bristle above at basal third, also one above near the tip; middle basitarsus with a row of hooked spines below and a row of nearly erect bristles above, which are as long as the width of the joint and a little bent at tip. Joints of fore tarsi as 54-15-11-5-6; those of middle ones as 47-17-14-8-5; joints of posterior pair as 46-19-15-7-8. Calypters yellow with a black edge and cilia; halteres yellow.

Wings grayish hyaline; cross-vein 26-fiftieths of a millimeter long; from the cross-vein to fork of fourth vein 40, from fork to wing margin 27, last segment of fifth vein 23-fiftieths of a millimeter; fork at nearly right angles to fourth vein, curved in a nearly regular arc to its tip.

Described from one male, given me by Prof. Cockerell and taken by him at Boulder, Colorado. *Type* in the author's collection.

This species looks very much like *scobinator* Loew; it differs from that species in having a row of slender, erect bristles on upper edge of middle basitarsus.

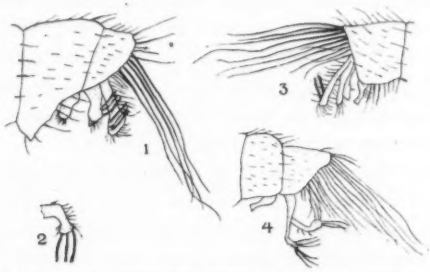
Psilopus caudatus Wiedemann and its allies.

While in Ottawa in November, 1925, Mr. C. Howard Curran called my attention to a series of what seemed to be *caudatus,* taken at Miami, Florida; they differed in some respects from the ones taken in the north and also from Dr. Becker's drawing,

which, as I understand, was made from South American specimens.

These three forms agree in size, form and color; all have long hairs at tip of the abdomen and also have a pair of somewhat clubbed, hypopygial appendages; they also all have the long spur at tip of middle tibiæ, the hooked bristles or spines on lower surface of middle basitarsus and conspicuous white hair on the face.

In all three forms there are finger-like formations at the tip of the hypopygial appendages; in the northern form there are two such fingers; in the Miami specimens there are three



DETAILS OF THE PSILOPUS CAUDATUS GROUP.

Fig. 1, Hypopygium of *Ps. graenicheri* new species. Fig. 2, Tip of the hypopygial appendage with its three finger-like projections, same species as the preceding. Fig. 3, Hypopygium of *Ps. caudatus* Wiedemann. Fig. 4, After Dr. Becker's drawing of *Ps. caudatus* Wied.; this is probably Wiedemann's South American species *smaragdulus*.

such fingers, this form I am calling *graenicheri;* Dr. Becker in his drawing shows two groups of three fingers to each appendage.

Wiedemann described *caudatus* from Georgia (Aussereuropaische Zweiflugelige Insekten, Vol. ii, p. 224, 1920); this is no doubt our northern form and the same that Dr. Loew described in 1864 as *caudatulus* from Illinois and Missouri; I have seen specimens of this form from several of the northern states and Ontario, also from Georgia, Bradentown, Florida, and Utah Lake, near Lehi, Utah, all of these agree in having only two fingers to each appendage (Figure 3). If Dr. Becker's drawing was made from a South American specimen, as I suppose

it may have been, it probably is *smaragdulus* Wiedemann, described from South America on the page following the description of *caudatus;* it differs from both of the other forms in having two groups of three fingers to each appendage (Figure 4); the Miami, Florida, specimens in the Canadian National collection have three fingers to each appendage (Figures 1 and 3).

Both North American species *(caudatus* and *graenicheri)* have long bristles on the venter of the last two segments of the abdomen in both male and female; white hair on lower surface of all femora; fore coxæ with white hair and two black bristles, one at apical third and one near the tip; fore and middle femora each with several black bristle-like hairs near the tip, those on anterior pair on posterior surface and those on middle ones on anterior surface; posterior femora with one preapical bristle, and posterior basitarsi with a bristle at base below in both sexes.

Psilopus caudatus Wiedemann.

The male has one bristle on fore tibiæ at basal fourth of upper anterior edge and three on upper posterior edge, all very small; middle tibiæ with one large bristle near basal third of upper anterior edge, one or two smaller ones near apical third of upper posterior edge and three slender ones on lower anterior edge of basal half. In the female the fore tibiæ have two bristles on lower posterior edge, one near the middle and one near the base, also one above near basal fourth; middle tibiæ with two bristles on upper anterior edge, a large one at basal third and one at apical third, also one near the middle of upper posterior edge; below they have one pair near the middle and sometimes a very small pair beyond these.

Both male and female have one large bristle near basal third of upper posterior edge, but none near apical third as found in the male of *graenicheri.* Joints of fore tarsi of the male as 44-14-11-7-6; of middle ones as 48-18-13-8-6; those of posterior pair as 42-19-13-7-7, the two apical joints are scarcely widened. Joints of fore tarsi of female as 37-15-12-6-5; of middle ones as 48-19-14-7-6; those of posterior pair as 40-19-8-5-6. The longest hairs at tip of hypopygium are 57-fiftieths of a millimeter long.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., MARCH, 1927.

The New Index to Entomological Literature.

The twenty-sixth number of Dr. Walther Horn's *Et Meminisse et vaticinari liceat*, after briefly referring to the ever increasing bibliographical difficulties of the entomologist and the existing means of coping with them, continues:

Along with the annual summaries there exists the necessity for retrospective bibliographies covering long periods of time. It is no accident that the historically greatest biographer of the entomological world, Hagen, has trodden this path in his *Bibliotheca Entomologica*. For a long while my thoughts have been turned as to whether it would be possible to walk in his paths; in the last twelve months the plan has assumed a practical form. For some weeks it has been in execution. The Entomological Institute under my direction had to alter essentially its work; Entomobibliography shall gradually become one of its chief functions.

Since Hagen's *Bibliotheca* has long been out of print and a large number of the most widely scattered additions to it exist, I have decided to prepare a new edition of it, with the aid of Herr S. Schenkling. Even now we can say that we will give in it more than 1000 additions and corrections. Since its outer form will be essentially different from that of the "old" Hagen, we consider it sacrilegious to retain the old name *Bibliotheca Entomologica;* classical works should not be plastered over. The new edition will therefore receive the title *"Index Litteraturae Entomologicae,* Band I, die gesamte bis 1863 erschienene entomologische Literatur umfassend" [Index to Entomological Literature, Volume I, comprising all the entomological literature published up to 1863]. This first volume will appear in four parts (as numbers 14, 15, 16 and 17 of *Supplementa Entomologica;* probably at 11 marks), the first of which, it is hoped, will come out about the middle of next year [*i. e.*, 1927]. Supplementary to this there will be established, in the Deutsche Entomologische Institut, a great card catalog, comprising all the later literature up to current issues, which will be at the international service of every en-

tomologist for information. Whether, and in what form, this may be published later remains in the bosom of the future. I hope, however, to live to see published that part of it treating of the literature from 1864 to 1893 or 1900, or even, if possible, to 1912 (the date of beginning of Guy Marshall's indexes)'.

It is intended to give with each volume, as a supplement, a large number of portraits of the entomologists of the corresponding period. The price of these supplements will vary.

I see very clearly that this new task of the institute under my direction is a very great one, for which only scanty means are at hand. Many difficulties can be overcome by organization and this depends upon whether it may be possible to organize a small international group of collaborators who, looking at bibliography from the standpoint of the specialist, will each of them supervise a particular subdivision of the literature. I hope it will be possible in this way to raise bibliography to a generally recognized independent branch of entomology. The fate of entomology of the future rests in great part on its shoulders. (Entom. Mitteilungen, XV, No. 3-4, pp. 209-211. Berlin-Dahlem, July 1, 1926).

Personals.

The Trustees of the British Museum have appointed Major E. E. Austen, deputy keeper of the department of entomology at South Kensington, to the keepership of the department on the retirement of Dr. C. J. Gahan from this position on January 20. (*Science*, Dec. 31, 1926).

Dr. H. W. Allen has been assigned to the parasite work of the Japanese Beetle Laboratory, Riverton, New Jersey.

Dr. Alfred E. Emerson, of the University of Pittsburgh, will make a year's study in Europe, to work on the phylogeny of termite castes.

Dr. E. A. Schwarz has retired from activity in the United States Department of Agriculture, but retains his title of Honorary Custodian of the Coleoptera in the National Museum.

Mr. M. McPhail has accepted a position as entomologist in the lower valley substation, Mercedes, Texas.

Mr. David Dunavan is an assistant professor in Zoology and Entomology at the South Carolina Agricultural College.

American entomologists will be pleased to learn that Professor Mario Bezzi, a great authority on the Diptera of the world, has been promoted by being made Professor of Zoology

and Director of the Zoological Museum in the Royal University of Turin. Professor Bezzi began his active career as a dipterist some forty years ago in Sondrio, Italy, and has been for a long time connected with the Lyceum in Turin. He is now justly advanced to one of the prominent scientific positions in his country, succeeding Professor Ermanno Giglio-Tos, who died a few months ago.

Chiromyia oppidana Scopoli occurring in the United States (Dipt.)

Several specimens of this European species have been taken on windows in entomological offices in Washington, D. C. I have seen one collected by Frederick Knab, on May 10, 1911; one by W. L. McAtee, on May 28, 1912; three by J. R. Malloch, on June 3, 1922; and another by the same collector on May 19, 1925. The specimens are in the Biological Survey except the one collected by Knab and one of Malloch's first lot, which are in the National Museum. The species differs from those previously known in this continent in having the third antennal joint black, a striking mark. The species was originally described as *Musca oppidana* by Scopoli in his Ent. Carniolica, 1763, p. 349. Becker has given a good description in Zeitsch. f. Hym. u. Dipt., IV, 1904, 131; he erroneously referred it to the genus *Peletophila*. Bezzi corrected this and gave full synonomy in Soc. Ital. Sci. Nat., XLIII, 1904, 10; this is quoted in the Palaearctic Catalogue IV, p. 233. Malloch incorporated Bezzi's generic synonomy in a review of the known American species, in Proc. Ent. Soc. Wash., XVI, 1914, 179-181, but did not include *oppidana*.

J. M. ALDRICH.

The Bowditch Collection of Coleoptera.

The family of the late Mr. Fred. C. Bowditch has presented his great collection of Coleoptera to the Museum of Comparative Zoology. There are two principal portions: (1) a general collection of Coleoptera of the world based on the famous G. D. Smith collection, and (2) special collection of the Chrysomelidae, containing the Jacoby collections (except part of the second), the Tring Museum collection, and an enormous amount of other material. Of the Chrysomelidae there is an arranged collection in over 250 double boxes contained in 29 metal cabinets, and an immense amount of miscellaneous material, partly unassorted. The Jacoby collection contained over 2000 types, and Mr. Bowditch added several hundred more.

N. BANKS.

Entomological Literature

COMPILED BY E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

Papers of systematic nature will be found in the paragraph beginning with (N). Those pertaining to Neotropical species only will be found in paragraphs beginning with (S). Those containing descriptions of new forms are preceded by an *.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Papers published in the Entomological News are not listed.

1—Trans., American Ent. Soc., Philadelphia. **4**—Canadian Ent., Guelph. **6**—Jour., New York Ent. Soc., New York. **7**—Ann., Ent. Soc. America, Columbus, Ohio. **8**—Ent. Monthly Mag., London. **9**—Entomologist, London. **10**—Proc., Ent. Soc., Washington. **11**—Deutsche Ent. Zeitschrift, Berlin. **13**—Jour. of Ent. and Zoology, Claremont, Cal. **17**—Ent. Rundschau, Stuttgart. **18**—Intern. Ent. Zeitschrift, Guben. **19**—Bull., Brooklyn Ent. Soc. **27**—Bull. Soc. Ent. Italiana. **36**—Trans., Ent. Soc. London. **49**—Ent. Mitteilungen, Berlin. **50**—Proc., U. S. National Museum. **56**—Konowia, Wien. **63**—Deutsche Ent. Zeitschr., "Iris" Dresden. **69**—Comptes R., Acad. Sci. Paris. **74**—Acta Ent. Mus., Pragae. **75**—Ann. & Mag. of Nat. Hist., London. **79**—Koleopterolog. Rundschau, Wien. **101**—Biological Bul., Woods Hole, Mass. **127**—Archiv f. Entwickl. der Organis., Berlin. **133**—Jour. Experimental Zool. **137**—Archiv f. Zoologi, Stockholm. **153**—Bull. Museum Nat. Hist. Naturelle, Paris. **154**—Zool. Anzeiger, Leipzig.

GENERAL.—Angleman, J. B.—Obituary notice. **19,** xxi, p. 181. **Anon.**—Pour l'amour de l'entomologie. Le Naturl. Canadien, liii, p. 121-3. **Baudrimont, A.**—Attraction que peut exercer sur les insectes la lumiere refletee par les surfaces liquides. Act. Soc. Linn. Bordeaux, lxxvii, p. 113-117. **Baudrimont, A.**—Sur l'attraction des insectes par le miroitement de l'eau au bord de la mer. Act. Soc. Linn. Bordeaux, lxxvii, p. 125-128. **Bell, E. L.**—Collecting at Wilmington, North Carolina, and Suffolk, Virginia.

6, xxxiv, p. 351-354. **Cockayne, E. A.**—Homoeosis and heteromorphosis in insects. **36,** lxxiv, p. 203-230, ill. **Giglio-Tos, E.**—Necrologie. Rev. Gen. Sci. Pur. et Appl., xxxvii, p. 689-690. **Heikertinger, F.**—Der gartentopf als insektenzuchtgerät. **79,** xii, p. 177-191. **Holmquist, A. M.**—Studies in arthropod hibernation. **7,** xix, p. 395-428, ill. **Horn, W.**—Et meminisse et vaticinari liceat. Ueber den auftakt. **49,** xv, p. 329-330. **Janson, O. E.**—Obituary. **8,** lxiii, p. 15-16, ill. **Kieffer, J. J.**—Biography with portrait. Brotéria, Ser. Zool., xxiii, p. 126-148. **McAtee, W. L.**—Nomina conservanda from the standpoint of the taxonomist. **10,** xxviii, p. 189-190. **Morice, F. D.**—Obituary. **9,** lix, p. 328. **Robertson, C.**—Flowers and insects. XXIV. Ecology, Brooklyn, viii, p. 113-132. **Weiss, H. B.**—James A. Turner and his "Remarks on the Linnaean orders of insects." **4,** lviii, p. 287-289. **Weiss, H. B.**—Insects and homeopathic mágic. **6,** xxxiv, p. 342. **Weiss, H. B.**—The entomology of Hakluyt's "Voyages." The entomology of Pliny the Elder. **6,** xxxiv, p. 354; 355-359. **Williams, C. B.**—Further records of insect migration. **36,** lxxiv, p. 193-202. **Wilson, G. F.**—Insect visitors to sap-exudations of trees. **36,** lxxiv, p. 243-254, ill.

ANATOMY, PHYSIOLOGY, MEDICAL, ETC.—Eltringham, H.—On the abdominal glands in Colaenis, Dione, and Eueides. On the structure of an organ in the hind-wing of Myrmeleon nostras. **36,** lxxiv, p. 263-266, ill.; p. 267-268, ill. **Fink, D. E.**—A micro method for estimating the relative distribution of glutathione in insects. Science, lxv, p. 143-145. **Grabe, A.**—Einiges zur frage des industrie-melanismus. **18,** xx, p. 309-315. **Hosselet, C.**—Sur la genese de myofibrilles de structure radiée dans les myoblastes des pattes de Culex annulatus. **69,** clxxxiv, p. 119-121. **King, S. D.**—Note on the oogenesis of Peripatopsis capensis. Quart. Jour. Micro. Sci., lxx, p. 553-8, ill. **Komai, T.**—The culture medium for drosophila. Science, lxv, p. 42-43. **Redfield, H.**—The material inheritance of a sex-limited lethal effect in Drosophila melanogaster. Genetics, Brooklyn, xi, p. 482-502. **Rudolfs, W.**—Studies on chemical changes during the life cycle of the tent caterpillar (Malacosoma americana). Nitrogen and its relation to moisture and fat. **6,** xxxiv, p. 319-330, ill. **Spencer, W. P.**—A gynandromorph in Drosophila funebris. Am. Nat., lxi, p. 89-91. **Sturtevant, A. H.**—The effect of the bar gene of Drosophila in mosaic eyes. **133,** xlvi, p. 493-498, ill.

ARACHNIDA AND MYRIOPODA.—Hirst, S.—Note on the development of Allothrombium fuliginosum. Jour. R. Microsc. Soc., xlvi, p. 274-276, ill. **Phisalix et Marcenac.**—La soi-distant immunite naturelle du Cien sloughi aux venins de scorpion et de vipere, ainsi qu'ua virus rabique. **153**, 1926, p. 275-277. **Smith, F. R.**—Observations on scorpions. Science, lxv, p. 64.

(S) **Enderlein, G.**—Psyllidologica VIII. **49**, xv, p. 397-401. ***Lombardini, G.**—Duo nova genera acarorum. **27**, lviii, p. 158-161, ill. ***Myers & Salt.**—(See under Hemiptera). ***Roewer, C. F.**—Fauna sumatrensis. Opiliones-Laniatores. **49**, xv, p. 297-302. ***Sellnick, M.**—Alguns novos acaros (Uropodidae) Myrmecophilos e termitophilos. Arch. Mus. Nac. R. de Janeiro, xxvi, p. 29-56, ill.

THE SMALLER ORDERS OF INSECTA.—Babaud, E.—Sur le régime alimentaire des larves de Chrysopa vulgaris. La Feuil. Natural. xlvii, p. 164-167.

(N) **Hill, G. F.**—The genus Porotermes (Isoptera). Proc. R. Soc. Victoria, xxxviii, p. 143-149. ***Huggins, J. R.**—Variations in size of Calopteryx maculata and a proposed new subspecies (Odonata; Agrionidae). **1**, lii, p. 355-364. ill. ***McDunnough, J.**—New Canadian Ephemeridae with notes IV. **4**, lviii, p. 296-303, ill.

(S) ***Cockerell, T. D. A.**—A new mayfly from Peru, **19**, xxi, p. 189-191. ***Esben-Petersen, B.**—Fauna sumatrensis. Neuroptera 88. **49**, xv, p. 404-407, ill. ***Longinos Navas, R. P.**—Algunos insectos del Museo de Paris. Brotéria, Ser. Zool., xxiii, p. 95-115, ill. ***Samal, J.**—Fauna sumatrensis. Plecoptera. **49**, xv, p. 302-305, ill.

ORTHOPTERA.—Criddle, N.—The life history and habits of Anabrus longipes. **4**, lviii, p. 261-264. **Hugues, A.**—Sur la répartition geographique des orthopteres. La Feuil. Natural., xlvii, p. 168. **Meissner, O.**—Ein fall von neotenie bei Carausius morosus. **17**, xliii, p. 45.

(N) ***DeLong & Cartwright.**—The genus Chlorotettix. A study of the internal male genitalia. Including the description of a new species. **7**, xix, p. 499-511, ill.

(S) ***Hebard, M.**—Studies in Dermaptera and Orthoptera of Colombia. Fourth paper. Orthopterous family Tettigoniidae. **1**, lii, p. 275-354, ill.

HEMIPTERA.—Muir, F.—The morphology of the aedeagus in Delphacidae (Homoptera). **36,** lxxiv, p. 377-380, ill. **Olsen, C. E.**—Some interesting cicadellid papers. 19, xxi, p. 185-187. **de la Torre-Bueno, J. R.**—Kentucky heteroptera new to the state. **19,** xxi, p. 190-191.

(N) **Esaki, T.**—Remarks on the Linnean species of Nepa and Laccotrephes (Nepidae). **19,** xxi, p. 177-181. **Goding, F. W.**—Classification of the Membracidae of America. **6,** xxxiv, p. 295-317. ***Hottes, F. C.**—Two new species of Aphididae from Minnesota. Proc. Biol. Soc. Wash. Vol. xxxix, 114 pp. ***Hungerford, H. B.**—Some new Corixidae from the north. **4,** lviii, p. 268-272, ill. ***Hungerford, H. B.**—Some undescribed Corixide from Alaska. 7, xix, p. 461-463, ill. ***Hungerford, H. B.**—Some new records of aquatic hemiptera from northern Michigan with the description of seven new Corixidae. **19,** xxi, p. 194-200. ill. ***Knight, H. H.**—Descriptions of seven new Paracalocoris with keys to the Nearctic species and varieties (Miridae). **7,** xix, p. 367-377.

(S) ***Myers & Salt.**—The phenomenon of myrmecoidy, with new examples from Cuba. **36,** lxxiv, p. 427-436, ill.

LEPIDOPTERA.—Anon.—New Long Island lepidoptera records from a White Cedar swamp. **19,** xxi, p. 187. **Babcock, K. W.**—The European corn-borer. Pyrausta nubilalis. I. A discussion of its dormant period. Ecology, Brooklyn, viii, p. 45-59. **Bell, E. L.**—Atrytanopsis vierecki from Texas. **6,** xxxiv, p. 317. **Bell, E. L.**—Collecting notes for Long Island, New York. **19,** xxi, p. 202. **Cleare, L. D.**—On the life history of Caligo illioneus illioneus, (Morphidae). **36,** lxxiv, p. 361-366, ill. **Crumb, S. E.**—The bronzed cutworm (Nephelodes emmedonia). **10,** xxviii, p. 201-207, ill. **Eltringham, H.**—On a new organ in the abdomen of Eryphanis polyxena. **36,** lxxiv, p. 367-369, ill. **Forbes, W. T. M.**—The species of Hübner's tentamen. **10,** xxviii, p. 191-201. **Ford, E. B.**—Zygaenidae attracted by the female of Lasiocampa quercus. Proc. Ent. Soc. London. I, p. 20-21. **Kreig.**—E. Titschack: Untersuchungen über den temperatureinfluss auf die kleidermotte (Tineola biselliella). **18,** xx, p. 333. **Mousley, H.**—Thanaos juvenalis. **4,** lviii, p. 293. **Mousley, H.**—Notes on the birds, orchids, ferns and butterflies of Mount Royal, Montreal; Further notes on the orchids, ferns and butterflies of North Hatley, Quebec. Canadian Field Nat. xl, p. 181-183; p. 178-179. **Phil-**

pott, A.—The uncus in the micropterygoidea. **36,** lxxiv, p. 371-376, ill. **Plunkett, C. R.**—The experimental production of melanism in lepidoptera. Am. Nat., lxi, p. 82-88. **Rummel, C.**—Notes on aberrations of New Jersey butterflies. **19,** xxi, p. 203 (cont.) **Townsend, M. T.**—The breaking-up of hibernation in the codling moth larva. **7,** xix, p. 429-439.

(N) ***Barnes & Benjamin.**—Notes and new species, (Phalaenidae). **4,** lviii, p. 303-310. **Barnes & Benjamin.**—On the placement of the names caduca and retis (Phalaenidae). **19,** xxi, p. 182-184. **Bell, E. L.**—Remarks on Megistias neamathla; A new locality for Thanaos tristis; Additional records of the distribution of some North American Hesperiidae. **19,** xxi, p. 184; 192. ***Blackmore, E. H.**—Two new greyas from British Columbia (Incurvariidae). **4,** lviii, p. 294-296. **Buckstone, A. A. W.**—Pyrameis cardui flying at night, etc. **9,** lx, p. 16. **Burgeff, H.**—Lepidopterorum catalogus. Pars 33: Zygaenidae I (Generis Zygaena palaearctica pars). 91 pp. **Forbes, W. T. M.**—The relationships of some aberrant pyralids. **6,** xxxiv, p. 331-338, ill. **Riley, N. D.**—On the identity of certain Hesperiidae described by Latreille. **36,** lxxiv, p. 231-241.

(S) ***Hering, M.**—Zur Kenntnis der südamerikanischen Nymphaliden-gattung Dione. **63,** xl, p. 195-204. ***Meyrick E.**—On micro-lepidoptera from the Galapagos Islands and Rapa. **36,** lxxiv, p. 269-278. ***Niepelt, W.**—Neue Morphoformen von Columbien. **18,** xx, p. 329. ***Röber, J.**—Lepidopterologisches. **49,** xv, p. 372-377.

DIPTERA.—Bonnamour, S.—Elevages et nouvelles liste dipteres fongicoles. Ann. Soc. Linn. Lyon, lxxii, p. 85-93. **Bromley, S. W.**—The external anatomy of the black horse-fly Tabanus atratus. (Tabanidae.) **7,** xix, p. 440-460, ill. **Hendel, F.**—Bemerkungen zu Dr. Beckers arbeit über die paläarktischen Ephydriden 1926. **11,** 1926, p. 353-355. **Mueller, A.**—Zur kenntnis des penis der Acalypteren. **56,** v, p. 240-246. **Smirnov u. Zhelochovtsev.**—Veränderlung der merkmale bei Calliphora erythrocephala unter dem einfluss verkürzter ernährungsperiode der larve. **127,** cviii, p. 579-595, ill. **Zavrel, J.**—Die mundteile der Tanypinenlarven. Bull. Inertn, Acad. Sci., Prague, xxi, p. 247-263, ill.

(N) ***Aldrich, J. M.**—Descriptions of new and little known diptera or two-winged flies. **50,** lxix, Art. 22, 26 pp. ***Curran & Alexander.**—Diptera collected by the late Allan

Crawford on Wrangel Island. **4,** lviii, p. 289-293. ***Curran, C. H.**—A new species of Comantella. (Asilidae.) **4,** lviii, p. 310-312. ***Felt, E. P.**—New non-gall making Itonididae. **4,** lviii, p. 265-268. ***Felt, E. P.**—Three western gall midges. **13,** xviii, p. 79-81. **Hendel, F.**—Beiträge zur systematik der Agromyziden. **154,** lxix, p. 248-271. **Johannsen, O. A.**—Diamesa (Psilodiamesa) lurida (Chironomidae). **19,** xxi, p. 205.

(S) ***Alexander, C. P.**—New species of crane-flies from South America I. (Tipulidae.) **7,** xix, p. 378-394. ***Alexander, C. P.**—New or little-known Tipulidae in the collection of Deutsches Entomologisches Institut. **49,** xv, p. 386-392, ill.

COLEOPTERA.—Arrow, G. J.—Mimicry in coleoptera. Proc. Ent. Soc. London, I, p. 18-19. **Baudrimont, A.**—Note complementaire sur la stridulation du prione tanneur. Act. Soc. Linn. Bordeaux, lxxxvii, p. 111-113. **Benick, L.**—Ueber atmungsintervalle einheimischer Dytisciden. **154,** lxix, p. 164-70. **Cockayne, E. A.**—Teratological coleoptera: Heteromorphosis, reduplication of leg, incomplete union of pronotum. **36,** lxxiv, p. 261-262, ill. **Dobzhansky, T.**—Ueber die morphologie und systematische stellung einiger gattungen der Coccinellidae (tribus Hippodamiina). **154,** lxix, p. 200-208. **Hatch, M. H.**—Notes on the morphology of the eyes of coleoptera. **6,** xxxiv, p. 343-348, ill. **Horn, W.**—Zur faunistik, synonymie etc. der Cicindelinen. **49,** xv, p. 369-372. **Kleine, R.**—Können myrmekophile Brenthiden fliegen? Folia Myrm. et Termit., I, p. 8-13, ill. **Netolitzky, F.**—Aus der praxis des käfersammlers. Ueber das sammeln auf lehmboden. **79,** xii, p. 207-209. **Scheerpeltz, O.**—Aus der praxis des käfersammlers. Ueber das sammeln ripikoler insekten auf schlamm, sand, und schotterbänken. **79,** xii, p. 245-257.

(N) ***Buchanan, L. L.**—A new otiorhynchid with single tarsal claws. **10,** xxviii, p. 179-181. ***Chittenden, F. H.**—A new species of Listronotus from north of Mexico. **6,** xxxiv, p. 341-342. **Fisher, W. S.**—New cactus beetles. **10,** xxviii, p. 214-218. ***Hatch, M. H.**—New and noteworthy Histeridae from Alberta. **4,** lviii, p. 272-276. **Hatch, M. H.**—Tillyard on Permian coleoptera. **19,** xxi, p. 193. **Obenberger, J.**—Revision monographique des Trachydes pachyscheloides de l'amerique. (Buprest) **74,** iii, p. 3-149, ill. ***Schaeffer, C.**—New species of Boloschesis (Chlamys) with

notes on known species (Chrysomelidae; Fulcidacinae). **10,** xxviii, p. 181-187.

(S) ***Arrow, G. J.**—Fauna sumatrensis. Endomychidae and Erotylidae. **49,** xv, p. 248-262. ***Aurivillius C.**—Neue oder wenig bekannte coleoptera Longicornia. **27,** xviii, No. 9, 22 pp. ***Fisher, W. S.**—Fauna sumatrensis. Buprestidae. **49,** xv, p. 282-295. ***Kessel, F.**—Synopse geral do genero Laemophloeus con a descripcâo de algumas novas especies sul-americanas. Arch. Mus. Nac. R. de Janeiro xxvi, p. 59-93. ***Kleine, R.**—Fauna sumatrensis. Lycidae. **49,** xv, p. 280-281, ill. ***Kleine, R.**—Ein neuer Rhaphirhynchus aus Brasilien. (Brenthidae) **74,** iii, p. 177. **Moser J.**—Fauna sumatrensis. Melolonthini. Cetonini. **49,** xv, p. 296-297. ***Pic, M.**—Coleopteres exotiques nouveaux ou peu connus. Ann. Soc. Linn. Lyon, lxxii, p. 73-77. ***Reichensperger, A.**—Cryptomimus, eine neue myrmekoide Staphylinidengattung. Zool. Anz., lxix, p. 113-25, ill.

HYMENOPTERA.—Balduf, W. V.—The bionomics of Dinocampus coccinellae. **7,** xix, p. 465-498, ill. **Bugnion, E.**—Les pièces buccales, les sac infrabuccal et le pharynx des fourmis. Folia Myrm. et Termit., I, p. 33-44, ill. **Frisch, K. v.**—Ueber den farbensinn der fische und der bienen. Schrif. Ver. Verbr. Naturh. Kennt. Wien. lix, p. 1-22. **Krausse, A.**—Ein neues formicarium. Folia Myrm. et Termit., I, p. 13-14, ill. **Lovell, J. H.**—Why do honey-bees swarm. Maine Nat., vi, p. 23-28. **Myers and Salt.**—(See under Hemiptera. **Schwarz, H. F.**—Observations on the bees of Rangeley, Maine. Maine Nat., Portland, v, p. 136-48. **Staeger, R.**—Messor Barbarus als ersteller gemanerter obernester oder nestkuppeln. Folia Myrm. et Termit., I, p. 21-29, ill. **Staeger, R.**—Unterirdische "grabkammern" in einem nest von Formica pratensis. Folia Myrm. et Termit., I, p. 14-21, ill. **Whiting & Whiting.**—Gynandromorphs and other irregular types in Habrobracon. **101,** lii, p. 89-120, ill.

(N) **Blüthgen, P.**—Beiträge zur synonymie der bienengattung Halictus (Apid.). **11,** 1926, p. 348-352. ***Bradley, J. C.**—Descriptions of North American species of Pristaulacus (Aulacidae). **19,** xxi, p. 173-176. ***Crawford, J. C.**—North American bees of the genus Panurginus. **10,** xxviii, p. 207-214, ill. ***Fouts, R. M.**—Notes on Serphoidea with description of new species. **10,** xxviii, p. 167-179. ***Kamal, M.**—Four new species of parasites for aphidophagous Syrphidae. **4,** lviii, p. 283-286.

(S) ***Berland, L.**—Les Sphegidae du museum national de Paris. **153**, 1926, p. 200-206, 282-285 (cont.). ***Cockerell, T. D. A.**—Descriptions and records of bees. **75,** xviii, p. 621-627. **Menozzi, C.**—Due nuove specie di Eciton (Formicidae). Folia Myrm. et Termit., I, p. 29-32, ill. **Reichensperger, A.**—Das female von Eciton mattogrossensis. **49,** xv, p. 401-404, ill.

SPECIAL NOTICES

Novitates Macrolepidopterologicae. Katalog der in "Seitz" nicht enthaltenen und seitden neu beschriebenen palaearktischen macrolepidopteren. Herausg. von Otto Bang-Haas. Band 1, bis zum jahre 1920. Dr. O. Staudinger und A. Bang-Haas, Dresden-Blasewitz. 1926, 238 pp.

Monograph of the Tribe Hesperiidi (European Species) with Revised Classification of the Subfamily Hesperiinae . . . based on the Genitalic Armature of the Males. By B. C. S. Warren, Trans. Ent. Soc. London, lxxiv, pp. 1-170. Ill.—Many years ago the writer sent to Dr. J. L. Reverdin in Switzerland a large number of the species of American Hesperiidae and slides of the genitalia. Dr. Reverdin at that time contemplated monographing the family, and did write several papers on the European and some of the American forms. Then there was a lapse, the war and other distractions intervening, and finally he wrote me that he had abandoned the idea on account of his inability to secure sufficient representation of the American species and I was not aware until the publication of the paper, referred to above, that he had turned his material and data over to Mr. Warren, to continue the work. The results, however, show that Reverdin's choice of his successor was well made, and Mr. Warren's sixteen years of labor have resulted in a remarkable paper which seems to be the last word as to the European species and which also contains a great deal of information on the subject of the male genitalia and on the other species of the old world.

Mr. Warren states that he has sacrificed artistry to accuracy in figuring type and typical insects though sometimes broken or with the abdomen removed, but the excellent photographs of the butterflies and the genitalia, their unusual clearness and accuracy in reproduction, and the general set-up of the plates, without crowding and well arranged, make it exceedingly pleasing to the eye, and in my opinion, truly artistic. The sixty plates give figures of all the European species with

many variations, the male genitalia of each and also of many of the old world extra-European species, together with many enlargements of the insects and details of the genital armature most useful in their identification, some of them being superficially very similar.

It is now generally conceded that the male genitalia, in most groups of the Hesperiidae, offer the best characters for separating the species, and Mr. Warren goes further (and I agree with him) that these characters are also of the highest generic value. The information given, the deductions made by him, and the nomenclature used in describing and discussing these characters are sensible and clear.

Of the species of Hesperiidae covered, there are two which occur in America, *centaureae* and Warren's own species, *freija*. His paper will stimulate interest in this country, and our collectors will overhaul their series, so that we may be able to map out more accurately the distribution of these two, which may be migrants from the European Metropolis of the Genus *Hesperia*.

A word on the terms used in describing the genitalia may be of interest. The words "clasp," "valve," and "harpe," have been used indiscriminately to mean the entire structure of the grasping organs. Mr. Warren uses the word "clasp" for the entire structure; the word "harpe" for the dorsal lobe; the word "cuiller" (a very apt one) for the external ventral lobe; the internal proximal portion, he calls the "ventral plate," and he also very interestingly calls attention to the fact that the clasp is separable laterally.

All of this is excellent, and I believe the nomenclature should be generally adopted. However, the process, which Mr. Warren designates as the "lateral apophysis of the tenth sternite" might be called the "scaphium," as used by Pierce for a process below the uncus, a structure which is present in a very large percentage of the Hesperiidae.

As to the taxonomy, Mr. Warren has rather reversed the usual American conception of some of the terms. We have been using the word "race" in the same sense that he uses the word "subspecies," and he has sunk "race" to mean the lowest form of variation just above "aberration." Our conception of "race" carries with it the idea of locality, and we have been using the word "form" for variation in a given locality, whether seasonal, dimorphic, color phase, or otherwise. I call attention to this, not in a critical mood, but that students may understand the values of these terms as rather generally used by the American and many European writers.

It is a pity to wind up a review of such a remarkably studious and fine paper with a criticism, but it seems the custom for reviewers to do this so I will call attention to the fact that Mr. Warren, whose selection of the generic names was based on Tutt's diagnoses, was evidently unaware of the publication of Dr. Lindsey's paper on the "Types of Hesperioid Genera," which appeared in the "Annals of the Entomological Society of America" in March, 1925. I am perfectly aware of the long time frequently elapsing between the manuscript and the printed page, and I appreciate that this time must have been long extended in a paper so elaborately illustrated as this one, nevertheless, some one of his friends should have called his attention to this situation. Of course, the paper can not be considered, like the Tentamen, as non-published, and if Lindsey is correct (and I believe him to be 98% right) most of the generic names mentioned by Mr. Warren, with the exception of those erected by himself, will have to be replaced by others. R. C. WILLIAMS, JR.

HOW INSECTS LIVE; an Elementary Entomology by WALTER H. WELLHOUSE. The Macmillan Company, New York. 435 pages, ill. $5.00.—In this book we have a manual which is intended to give students of economic entomology the necessary fundamental knowledge of insects as a class, especially of those illustrating the principal habits of the insect group as well as the principal orders of the group. Most of the species chosen are widely distributed over North America and are commonly seen by any observing person. The book should appeal to county agents of the farm bureaus, teachers of agriculture, farmers and fruit growers, who lack the training given by the introductory course and have taken only an economic entomology course while in school. His plan differs from the usual one, in that there are fewer species used as types with more lengthy discussions as to their biology, life history, and appearances at different stages, with many well chosen illustrations. Each discussion is supplemented by "References," giving a list of articles wherein more detailed information may be gleaned, and is a very creditable adjunct. The text is very readable, especially appealing to the layman, and the matter is all apparently original, showing that much of the scattered literature had to be consulted by the author, in its preparation. Most of the illustrations are sharp and well made. A key to the principal orders and families is given and is, as the author states, "nothing more than a short cut to finding out what a

specimen is by the elimination of other groups." It is augmented by crude but suggestive figures of the typical insect. A chapter on the Phylum Arthropoda is included with the idea that after the student has learned the ways of the insect group he should associate that group in its proper place among the small creatures which are apt to be confused with insects. Another chapter gives suggestions for collecting and preserving insects.

Although the author says that "due regard for the systematic relationship of the species is given," this phase has not been carried out as it could and should have been without interfering with the general plan adopted by the author. The sequence of the orders in the main body of the book is not in conformity with that given in his chapter on the families of insects, and neither is in accordance with any proposed system. This seems to be the only adverse criticism of any importance that can be made, but his arrangement absolutely breaks up any concept of the proper sequence of the orders, families and genera. However, the sequence of the families in his chapter on the orders and families of the class insecta is what may be considered correct. E. T. CRESSON, JR.

HETEROPTERA OF EASTERN NORTH AMERICA, with especial Reference to the Faunas of Indiana and Florida. By W. S. BLATCHLEY, 1116 pages, 215 figures, xii plates. The Nature Publishing Co., Indianapolis, Ind. 1926.—The author of this volume has published three manuals, "The Coleoptera of Indiana" (1910), "Orthoptera of Northeastern America" (1920), and with Charles W. Leng, "Rhynchophora or Weevils of Northeastern America" (1916), which have proven of real service to professional entomologist and amateur collector alike, and we wonder how we ever managed to get along without them. Professor Blatchley has the faculty of preparing simple, concise, descriptive matter which any one can understand. The work on the Heteroptera is on the same plan and is nearly as large as his "Coleoptera of Indiana"; it is printed on the same kind of coated paper, making a rather heavy volume weighing about four and three-fourth pounds. Though I have not yet had the opportunity of using the keys and descriptions, I expect to find them workable, especially if they compare at all with those of the author's other manuals. In this work on the Heteroptera, Blatchley describes one new subfamily, four new tribes, one new genus, 29 new species, and four new varieties. Four of the new species were described from Indiana and 24 species and two varieties from Florida. On page 1087, a table

gives the number of species in each of the forty families treated in the work and also their distribution as regards Florida, Indiana and other states. Of the 1253 species treated, 414 are recorded from Indiana and 548 from Florida; 187 species are common to both states and 209 species are recorded only from Florida. A bibliography of 23 pages, though admittedly incomplete, contains most of the principal reference works.

There has been considerable activity, during the last few years, among students of the Heteroptera, and books like this of Professor Blatchley's have a tendency to stimulate further activity. Of course some workers are waiting for that great work now in preparation on the Heteroptera of the World, but until it appears this book by Professor Blatchley will be most useful. In fact a book of limited scope is often more useful to the majority of workers in the geographical area which it covers than the more pretentious work. It is evident that Blatchley's new book on the Heteroptera will be a welcome addition to our list of manuals treating of various groups of insects.

W. E. BRITTON.

HETEROPTERA OR TRUE BUGS OF EASTERN NORTH AMERICA with Especial Reference to the Faunas of Indiana and Florida. By W. S. BLATCHLEY. The Nature Publishing Company, Indianapolis. 9¼ x 6¼ inches, pp. 1116, 12 pls., 215 text figs., $10.00.

The assiduous Mr. Blatchley has produced another of his extraordinary manuals. What a half-dozen of authors (including myself) failed to do—though they announced their intention some years ago—this laborious and magnificently efficient scientist has accomplished. Here is a descriptive and pictorial manual of the eastern Hemiptera-Heteroptera, the character and value of which needs no other recommendation than to say that it is a bigger and better "Coleoptera of Indiana," *mutandis mutatis*.

The author has acquainted himself not only with a vast majority of the species occurring within his limits, but also with the extensive literature which has lately grown up about the subject. He quotes liberally from keys, descriptions and illustrations already published (which is of course in large part what they are for), but he declares his independence and makes such changes in rank and nomenclature as seem to him to be fitting. Of the more than 1200 species treated, 29 are described as new, and some new varieties and higher groups are proposed. There is a useful bibliography and a very full index.

Detailed and technical criticism will be gradually forthcoming as specialists scrutinize the work, but it goes without saying that this manual as a whole is reliable, comprehensive and as fully simplified as the subject allows. It is, says Mr. Blatchley, the last of his manuals; let us hope not. But if so, the four will stand as a life-work of rarely equalled value, quite sufficient to justify the laurels that we herewith ungrudgingly place athwart his brow. H. M. PARSHLEY.

THE INSECTS OF AUSTRALIA AND NEW ZEALAND, By R. J. TILLYARD. Angus and Robertson, Ltd., Sydney, 1926.—The appearance of this work has been anxiously awaited by many Americans since the announcement of its forthcoming publication by the author during his recent American tour. It is, as stated by the author, designed primarily as a textbook for students of Australia and New Zealand and secondarily for those who maintain an interest in the insect fauna of that region. However, to the morphologist and systematist, even without an interest in the area under consideration, this work will rank as of prime importance especially for the studies contained therein on insect wing venation which comprise, not only the bringing together of recent publications by Tillyard on the subject, but also in several instances new and unpublished data on insect wings.

Nothing since the publication of Comstock's notable work on wing venation equals the comprehensiveness of this new book. Going deep into the subject of fossil wings, he has made numerous changes in the interpretation of the homologies in several orders which simplify the study especially for the beginning student. As an example of this, Tillyard's view that the vein Cu_1 is composed of two branches Cu_{1a} and Cu_{1b} and that the vein lying in the anal fold is Cu_2 was tried on a group of beginning students in wing venation and it seemed to offer a better explanation of the development of these veins and caused far less confusion in the interpretation of the modifications of these veins. The studies in Odonata dispute the crossing of Rs over M_2 as proposed in the Comstock-Needham system and seem to offer an easier solution of the problem. In the Hymenoptera far more radical changes are brought forth which in no way agree with the complicated MacGillivray system of terminology.

To those who heard the author's lectures on wing venation, these changes come as no surprise. It is of interest to point out that much of the new data obtained from fossil insects was

based on the relations of convex and concave veins, a subject far too little emphasized in the study of wing venation in this country.

The book is unique in the possession of practically an entire set of original illustrations, only a few of which have previously appeared in the author's older volume on Dragonflies. The large series of full page colored plates painted by Mrs. Tillyard are especially commendable. Adversely, little can be said, but space has limited the amount of discussion on internal anatomy. The author's use of the term "N. sp." (pages 49, 50 and elsewhere) is to be deplored, since obviously the descriptions do not accompany the names. Chapter 29 on the fossil record of insects is of especial interest. A good glossary is appended and in the words of a local printer, the book is very well done typographically. Students of insect structure can not afford to be without the work. It is further commendable on the part of the author that he advanced private funds toward the immense cost of publication in order to keep the price within the reach of the average student.

WM. P. HAYES, University of Illinois.

FIRST LESSONS IN NATURE STUDY. By EDITH M. PATCH, Dept. of Entomology, University of Maine, Orono. With 38 drawings by Robert J. Sim. New York, The Macmillan Co., 1926. 9¼ x 7 inches. 287 pp.—This book, appropriately dedicated to Anna Botsford Comstock, is composed of fifteen chapters with the titles Sugar, Milk and Animals that feed it to their young, Seeds, Meat and Hunters, Hunters that have backbones, The Cotton Plant and some of its relatives, Flax and some other fibre plants, Spinners, Fur Coats and animals that wear them, Caves and Dugouts, Buildings of Stone and other earthy stuffs, Traveling Homes, Houses of Wood, Questions and Answers. Insects appear in some of these chapters, as bees and aphids under Sugar; dragonflies, hornets and the "fiery hunter" [*Calosoma calidum*] under Meat and Hunters; caterpillars, cecropia and the silkworm under Spinners; the bumble bee and cricket under Caves and Dugouts. The book, both text and illustrations, should be a delight to entomologists of very tender years.

P. P. CALVERT.

ZOOLOGIE IM GRUNDRISS von Dr. WALTER STEMPELL, ord. Professor der Zoologie, vergleichenden Anatomie und vergleichenden Physiologie, Direktor des Zoologischen Instituts der Westfälischen Wilhelms-Universität zu Münster i. W. Mit 676 Abbildungen und Abbildungsgruppen im Text und 97

Lichtbildern. Berlin, Verlag von Gebrüder Borntraeger. 10½ x 7 inches. Erste (1925) u. zweite Lieferungen, pp. 1-160, 161-336.—A note on the second page of the familiar, orange-colored, paper covers of both Lieferungen informs us that for a long time there has been lacking a text book of zoology which treats equally of all branches of this science as they are today. The existing text books are mostly comparative morphology and taxonomy and treat not at all or but briefly of physiological and biological problems and mechanics of development, topics which are entering more and more into the foreground. The present book seeks to avoid this one-sidedness and to present modern zoology in its entirety and as a unit, bringing the synthetic method into its own rightful place, as well as the analytic. The erste lieferung contains a table of contents of the whole work but without the page numbers, so that information is lacking as to the amount of space devoted to each division of the subject. This division is as follows: Introduction (definition, scope, divisions and history of zoology—16 pp.) 1. Structure and Form of Animals (extending to beyond p. 336), 2. Life functions of Animals (Physiology and Development), 3 Living relations of Animals [ecology], 4. Descent of Animals (Phylogeny), 5. Theoretical Zoology and Conclusion. The second section above listed is in turn divided into A. Promorphology and B. Synopsis of the forms (Taxonomy and Comparative Morphology). The ten phyla under which all animals are grouped present no novel arrangement; Vermes and Molluscoidea are still in the running. The seventh phylum, Arthropoda (pp. 159-208), is subdivided into three subphyla—Diantennata (classes Entomostraca, Malacostraca), Chelicerata (classes Palaeostraca, Arachnoidea), and Antennata (classes Protracheata, Myriapoda, Insecta). The structure and development of insects in general are described on pages 189-198, while the following 10 pages, in smaller type, give the chief characteristics of each of the 17 orders here recognized. As one of these orders is the Pseudoneuroptera, the author's conservatism is evident. It is an excellent thing for a young student of zoology or entomology to read and study a text book of his science in one or more foreign languages as well as in his own tongue, thereby acquiring facts, views, vocabularies, idioms and modes of expression all at once. We have no means of judging the character of the last four sections of Prof. Stempel's *Grundriss*, but his first two lieferungen will be useful to the young student aforesaid.

P. P. CALVERT.

Doings of Societies.

The American Entomological Society

The stated meeting of September 23, 1926, was held in the hall of The Academy of Natural Sciences of Philadelphia. Mr. R. C. Williams, Jr., President, in the chair. Seven members were present. The meeting was given over to informal discussion and determination of specimens.

At a stated meeting held October 28, 1926, in the same hall, Mr. Williams presiding, sixteen members and visitors were present.

It was moved and seconded that the president appoint a committe to arrange for a meeting of the Entomological Society of America in the hall of The Academy on December 28.

The Publication Committee reported having published 14 papers during the year 1926 in the *Transactions* of the Society.

Mr. Robert J. Sim was elected to resident membership.

Announcement was made of an oil portrait of Dr. J. Breckenridge Clemens presented to the Academy by his family.

Dr. Calvert gave a short illustrated address on a previously announced subject, "New Characteristics in Identifying Dragonfly Larvae." The differentiation of genera of Libelluline larvae can be made on the number of teeth on the mandibles and also upon the presence and arrangement of divided setae on the segments of the tarsi and on the tibia. In the discussion that followed, Dr. Calvert spoke of the difficulties in rearing the larvae and of the numerous larval instars.

Mr. Williams referred to the recent visit of Mr. J. D. Gunder, of California, who is studying aberrrations of butterflies, and exhibited several aberrant forms and an abnormality, namely, a dark ♀ (*phileta*) of *Pieris monuste* from Florida with a caterpillar's head. This insect had evidently carried the larval head case through the pupal stage, not being able to cast it and had emerged in this manner. In other respects the insect was normal and was flying with other females of the species although it must have been blind.

R. J. TITHERINGTON, *Recording Secretary.*

At a stated meeting held November 18, 1926, in the same hall, Mr. Williams presiding, nine members were present.

Mr. J. H. Fiebiger was elected to resident membership.

The meeting was then continued in informal discussion and determination of specimens.

E. T. CRESSON, JR., *Rec. Secty* (pro tempore).

OBITUARY.

Deaths of the following entomologists have been announced:

Dr. CYRIL LUCKES WITHYCOMBE, lecturer in advanced and economic entomology at the University of Cambridge, known for his work on Neuroptera, on December 5, 1926, at the age of twenty-eight years (*Science*, Dec. 31, 1926).

Mr. J. C. HUGUENIN, of 1810 15th St., San Francisco, California, in December. His latest contribution to the NEWS was in July, 1921, entitled "Life History of Pyrameis caryae in California."

GEORGE LEWIS, for many years recognized as the chief authority on the Histeridae of the world, died at Folkestone, England, September 5, 1926. He was born August 5, 1839, and spent some years from 1862 on in China, as the representative of a firm engaged in the tea trade. From 1867 to 1872 and from 1880-1882 he was in Japan, spending six months in Ceylon on the return journey to England. In all these countries he made collections of beetles; those from Japan contain the types of a large proportion of the known species; they were acquired by the British Museum in 1910. His papers on Histeridae date from 1884 to 1915; in them he has described 60 genera and more than 750 species. His collections in this family were bequeathed to the same Museum. (Obit. in Entom. Mo. Mag., Nov., 1926.)

An obituary notice of the Rev. FRANCIS DAVID MORICE, whose death, at Woking, England, on September 21, 1926, was announced in the NEWS for January last (p. 32), is in the *Entomologist's Monthly Magazine* for November, 1926. He was born June 23, 1849, educated at private schools, Uppingham, Winchester and Oxford. He was ordained in 1873, and taught at Rugby 1874-1894. His interest in natural history was aroused in 1885 by his election as "President of the Rugby School Natural History Society, and in order to justify his election he thought he ought to know something about the things which were interesting his boys. A desultory study of the Lepidoptera was his first essay, but finding that some of the other orders promised a greater field of fruitfulness he turned his attention to the Hymenoptera and ultimately got in touch with Edward Saunders who became his friend and guide." He published upon Chrysididae, bees and wasps, but especially upon the Tenthredinidae; at the time of his death he was engaged upon a revision of the British species of this family. He was President of the Entomological Society of London in 1911 and 1912.

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Wanted—Bembidion (Coleoptera, Carabidae) from South America, Africa, Australia, India. Will buy or exchange for North American Species. Howard Notman, 136 Joralemon St., Brooklyn, N. Y., U. S. A.

Pselaphidae desired from all parts of N. A. for study. Will determine for privilege of study or pay cash. Am monographing family. F. C. Fletcher, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Buprestidae—I am making a revisional study of the North American Agrilus, and will be glad to examine any material in this genus collected north of Mexico. W. S. Fisher, U. S. National Museum, Washington, D. C.

Chrysomelidae—Desire to exchange coleoptera, especially in family Chrysomelidae. Send me your offerta in this family and your desiderata in coleoptera. Paul N. Musgrave, 601 Walnut Ave., Fairmont, W. Va.

Wanted—Cicindelidae & Cerambycidae in exchange for local coleoptera. Address Ernest Baylis, 5011 Saul Street, Philadelphia, Pa.

Buprestidae of the world and N. A. Carabidae and Rhynchophora wanted in exchange for other Coleoptera. Will buy rare species. Alan S. Nicolay, 198 Fernwood Ave., Upper Montclair, N. J.

For Exchange.—Cocoons of Actias luna, and Automeris io and Datana ministra and angusii and pupae of Papilio asterias; also coleoptera of China. Mrs. Robert Milde, Lewiston, Minnesota.

Wanted for Cash—Living pupae of P. ajax, cresphontes, rutulus, zolicaon, eurpmedon, Amph. nessus, Sph. abbottii, Ph. achemon, pandorus, Sph. Kalmiae, drupiferarum, Smer. cerisyi, Sam. gloveri, californica, etc. Send offer with prices to Max Rothke, 1841 E. Elm Street, Scranton, Pa.

Tropical Lepidoptera—A large variety to exchange for rare North American butterflies. Send for price-list. Hal Newcomb, Box 135, Highland Park Sta., Los Angeles, Calif.

Wanted—Coleoptera. I wish to purchase correctly named Coleoptera, from North America and Canada. Please send lists. Edwin E. Calder, R. I. College of Pharmacy, 235 Benefit St., Providence, R. I.

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896.—**Cresson** (E. T., Jr.).—Descriptions of new genera and species of diptera (Ephydridae and Micropezidae). (Trans., **52**, 249-274, 1926) ..... .55

HOMOPTERA.

888.—**DeLong** (D. M.).—Three new species of Cicadellidae previously confused with related species. II. The genus Lonatura. (Trans., **52**, 89-102, 1 pl., 1926)..... .35

HYMENOPTERA.

892.—**Frison** (T. H.).—Descriptions and records of No. American Bremidae, together with notes on the synonymy of certain species. (Trans., **52**, 129-145, 1926)..... .35

890.—**Mitchell** (T. B.).—New species of Megachile with notes and corrections. (Trans., **52**, 111-118, 1926)..... .20

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THYSANOPTERA.

891.—**Moulton** (D.).—New American Thysanoptera. (Trans., **52**, 119-128, 1926) ..... .25

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